No. 200400188

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

NDSU Research Foundation

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE , OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED, (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT, COMMON

'Steele-ND'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this fourteenth day of June, in the year two thousand and four.

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER
NDSU Research Foundation

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME
ND741

3. VARIETY NAME
'Steele-ND'

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
PO Box 5002
1735 NDSU Research Park Drive
Fargo, ND 58105-5002

5. TELEPHONE *(include area code)*
(701) 231-8931

6. FAX *(include area code)*
(701) 231-6661

FOR OFFICIAL USE ONLY

PVPO NUMBER
2004 00 188

FILING DATE
April 28, 2004

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*
501 (C) 3 Corporation

8. IF INCORPORATED, GIVE STATE OF INCORPORATION
North Dakota

9. DATE OF INCORPORATION
May, 1989

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*

Mohamed Mergoum
Department of Plant Sciences
North Dakota State University
PO Box 5051
Fargo, ND 58105-5051

Dale Zetocha
Executive Director
NDSU Research Foundation
PO Box 5002
Fargo, ND 58105-5002

FEES RECEIVED

FILING AND EXAMINATION FEES:
$ 3652.00
DATE 4/28/2004

CERTIFICATION FEE:
$ 432.00
DATE 5/17/2004

11. TELEPHONE *(Include area code)*
701-231-8478

12. FAX *(Include area code)*
701-231-8474

13. E-MAIL
mohamed.mergoum@ndsu.nodak.e

14. CROP KIND *(Common Name)*
hard red spring wheat

15. GENUS AND SPECIES NAME OF CROP
Triticum aestivum L.

16. FAMILY NAME *(Botanical)*
Gramineae

17. IS THE VARIETY A FIRST GENERATION HYBRID?
☐ YES ☑ NO

18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)

a. ☑ Exhibit A. Origin and Breeding History of the Variety
b. ☑ Exhibit B. Statement of Distinctness
c. ☑ Exhibit C. Objective Description of Variety
d. ☑ Exhibit D. Additional Description of the Variety *(Optional)*
e. ☑ Exhibit E. Statement of the Basis of the Owner's Ownership
f. ☑ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository)*
g. ☑ Filing and Examination Fee ($3,652), made payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)*

19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? *See Section 83(a) of the Plant Variety Protection Act)*
☑ YES *(If "yes", answer items 20 and 21 below)* ☐ NO *(If "no", go to item 22)*

20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? ☑ YES ☐ NO
IF YES, WHICH CLASSES? ☑ FOUNDATION ☑ REGISTERED ☑ CERTIFIED

21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☐ YES ☑ NO
IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS.
☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED
(If additional explanation is necessary, please use the space indicated on the reverse.)

22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES?
☑ YES ☐ NO
IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?
☑ YES ☐ NO
IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. *(Please use space indicated on reverse.)*

24. The owners declare that a viable sample of basic seed of the variety has been furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF OWNER		SIGNATURE OF OWNER	
Dale Zetocha			
NAME *(Please print or type)*		NAME *(Please print or type)*	
Dale Zetocha			
CAPACITY OR TITLE	DATE	CAPACITY OR TITLE	DATE
Executive Director NDSU Research Foundation	4/27/04		

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INSTRUCTIONS

GENERAL: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be **received** in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to **reproduce** the variety, or for tuber reproduced varieties verification that a viable *(in the sense that it will reproduce an entire plant)* tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for $3,652 ($432 filing fee and $3,220 examination fee), payable to "Treasurer of the United States" *(See Section 97.6 of the Regulations and Rules of Practice.)* Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfiled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 401, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of $432 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office
Telephone: (301) 504-5518
FAX: (301) 504-5291
Homepage: http://www.ams.usda.gov/science/pvpo/pvp.htm

ITEM

18a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified

18b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:

(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.

18c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.

18d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, *etc.*

18e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.

19. If "Yes" is specified *(seed of this variety be sold by variety name only, as a class of certified seed)*, the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. *(See Regulations and Rules of Practice, Section 97.103).*

22. *See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.*

23. *See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.*

21. CONTINUED FROM FRONT *(Please provide a statement as to the limitation and sequence of generations that may be certified.)*

22. CONTINUED FROM FRONT *(Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)*

USA - Released as a named cultivar, January 15, 2004.
First sale of seed to ND Crop Improvement Association for initial seed increase, March 22, 2004.

23. CONTINUED FROM FRONT *(Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)*

'Parshall' wheat is a component of this variety and received Plant Variety Protection in USA – Certificate No. 200000212 on April 24, 2001 by the NDSU Research Foundation. (See Attached Sheet)

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment or any modification of owner's name is specified in Section 97.175 of the regulations. *(See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)*

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, Room 213, Building 306, Beltsville Agricultural Research Center--East, Beltsville, MD 20705. Telephone: (301) 504-8089. http://www.ams.usda.gov/lsg/seed.htm

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 3.0 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

ST-470 (02-10-2003) designed by the Plant Variety Protection Office with Word 2000. Replaces former versions of ST-470, which are obsolete.

2

23. Continued

'Grandin' wheat is a component of this variety and received Plant Breeders' Rights Protection in Canada - Certificate No. 0046 on August 25, 1993 by the North Dakota Agricultural Experiment Station.

'Glupro' wheat is a component of this variety and received Plant Variety Protection in USA – Certificate No. 9600155 on October 31, 1996 by the NDSU Research Foundation.

200400188

EXIBIT A – ORIGIN AND BREEDING HISTORY

'Steele-ND'

Fall 1996 — Original cross was made at North Dakota State University (NDSU) Greenhouse at Fargo, ND.

Pedigree- **PARSHALL/ND706**

PARSHALL is a hard red spring wheat cultivar developed at NDSU and released by NDSU-AES in 1999 (**PVP 200000212**)

ND 706 is public breeding line derived from the cross GRANDIN/3/IAS20*4/H567.71//AMIDON/4/ND674

GRANDIN is a hard red spring wheat cultivar developed at NDSU and released by NDSU-AES in 1989

IAS20*4/H567.71 is public breeding line received from CIMMYT

AMIDON is a hard red spring wheat cultivar developed at NDSU and released by NDSU-AES in 1988

ND674 is public breeding line derived from the cross GRANDIN*2/ND 643

ND 643 is public breeding line released as "GLUPRO", a hard red spring wheat cultivar developed at NDSU and released by NDSU-AES in 1995. GLUPRO is derived from the cross "RL4352-1/T.dic//LEN". *Triticum dicoccoides* is the source of high protein and resistance to Fusarium Head Blight (FHB) Scab.

Spring 1997	F_1 plants, NDSU Greenhouse.
Summer 1997	F_2 plants EXP 22-67, NDSU research farm at Casselton: 200 heads were selected and threshed in bulk.
Fall 1997	F_3 bulk, NDSU Greenhouse Row #16. 10 heads selected from selected row #16, threshed and bulked.
Summer 1998	F_4, Preliminary yield trial EXP 25 plot #572, NDSU research farm at Casselton: 10 selected spikes were harvested and bulked.
Summer 1999	F_5, Intermediate Yield trials EXP 15# 1185, two locations, NDSU research farm at Casselton and Prosper at Prosper and Casselton.

	10 selected spikes were harvested and bulked and sent to Christchurch, New Zealand off-season winter nursery.	
Fall 1999-Spring	F_6, Generation advancement and seed increase and in Christchurch, New Zealand plot #00NZ3272	2000
Summer 2000	F_7 Advanced Yield trial EXP 14 plot # 1069, two locations, NDSU research farm at Casselton and Prosper. Seed increase, NDSU research farm at Casselton (Drill strip Inc# 35),	
Summer 2001	F_8, statewide yield trial, 6 locations, NDSU Research and Extension Centers. Uniform Regional Hard Red Spring Wheat Nursery, 12 locations, North Dakota, South Dakota, Minnesota, Montana, and Canada. Experiment line designation- ND 741.	
Fall 2001-Spring	F_9, Generation advancement and seed purification in Christchurch, New Zealand	2002
Summer 2002	F_{10}, statewide yield trial, 6 locations, NDSU Research and Extension Centers. Uniform Regional Hard Red Spring Wheat Nursery, 12 locations, North Dakota, South Dakota, Minnesota, Montana, and Canada. Seed increase by Seedstocks project.	
Summer 2003	F_{11}, statewide yield trial, 6 locations, NDSU Research and Extension Centers. Uniform Regional Hard Red Spring Wheat Nursery, 4 locations in North Dakota. Second year seed increase by Seedstocks project.	
January 15, 2004	ND 741 was released as a named cultivar, Steele-ND.	
March 22, 2004	First sale seed of Steele-ND.	

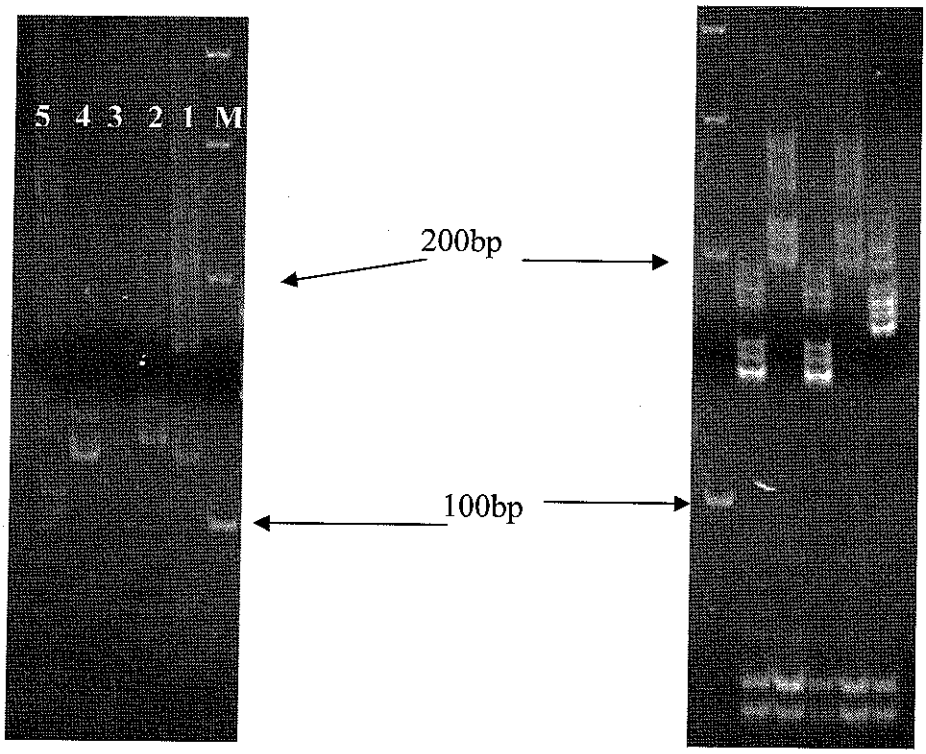
Steele-ND was observed for eight crop cycles (F_4-F_{11}) generations) from 1998 to 2003 and was stable and uniform within commercially acceptable limits for all traits described in Exhibit C. **Taller** plants variants (5-30 cm) at a frequency of 1/1,000 and **awnless** plant variants at a trace frequency of less than 1.5/10,000.

Steele-ND was developed using a modified pedigree and bulk methods. Selection criteria for the breeding of Steele-ND wheat were highly heritable traits (i.e. plant vigor and height, maturity, and pests resistance) in early segregating generations F_2-F_4. Starting at F_4 generation, selection criteria also included grain yield, lodging resistance, shattering resistance, test and kernel weights and bread making characters (grain protein, milling extraction, dough mixing, loaf volume, external and internal loaf appearance) started at F_6. Data used to evaluate line ND 741 that is named Steele-ND were

collected from numerous locations and across years. Overall, the selection criteria were a combination of traits used to identify a superior hard spring wheat genotype adapted to North Dakota wheat production with superior (compared to check cultivars) milling and bread-making properties for domestic and export markets. In this regard, Steele-ND was selected, particularly for its high yield, very good quality traits (milling and baking) as well as good level of resistance to ***Fusarium*** scab (FHB) close or comparable to Alsen.

EXHIBIT B – NOVELTY STATEMENT

To the best of my knowledge, Steele-ND most resembles Reeder, Alsen, Dapps, and Parshall HRS wheats. These cultivars can be unambiguously differentiated at the molecular level using microsatellite markers. The microsatellite loci we have used are described by Roder et al (1998). DNA fragment analysis was carried out on 6% non-denaturing polyacrylamide gel using ethidium bromide to detect the DNA fragments as described by Shi et al (2001). The procedure was repeated to confirm reproducibility of the results.



A B

Figure 1: Microsatellite analysis to differentiate Steele-ND (lane 1) from Reeder (lane 2), Alsen (lane 3), Dapps (lane 4), and Parshall (lane 5). Lane 'M' is a molecular weight standard. (A) Microsatellite *Xgwm33*. Steele shows a band of ~120 bp whereas Reeder shows a band of ~125 bp. Alsen and Dapps shows a band of the same size as Steele. Parshall show a band at ~111bp. (B) Microsatellite *Xgwm493*. Steele-ND shows a band of ~162 bp whereas Reeder and Dapps show a band of ~197bp. Alsen and Parshall show a band at ~141bp.

References:

Röder, M.S., Korzun, V., Wendehake, K., Plaschke, J., Tixier, M.H., Leroy, P., and Ganal, M.W. 1998. A microsatellite map of wheat. Genetics. 149:2007-2023

Shi, J., Ward, R. and Wang, D. 2001. Application of a high throughput, low cost, non-denaturing polyacrylamide gel system for wheat microsatellite mapping. In Natl. Fusarium Head Blight Forum. Erlanger, KY. December 8-10, 2001. Edited by Canty, S.M., Lewis, J., Silver, L., and Ward, R.W. Kinko's Publisher, Okemos, MI.

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Form Approved - OMB No. 0581-0055

instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

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AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705

EXHIBIT C
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (*Triticum* spp.)

NAME OF APPLICANT(S)
NDSU RESEARCH FOUNDATION

ADDRESS *(Street and No. or RD No., City, State, and Zip Code)*
NDSU RESEARCH FOUNDATION
1735, NDSU RESEARCH PARK DRIVE
P.O. BOX 5002, FARGO, ND 58105-5002

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PVPO NUMBER 2004 00 188

VARIETY NAME
STEELE_ND

TEMPORARY OR EXPERIMENTAL DESIGNATION
ND 741

PLEASE READ ALL INSTRUCTIONS CAREFULLY: Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in the first box (e.g. [0][9][9] or [0][9]) when number is either 99 or less or 9 or less respectively. Data for quantitative plant characters should be based on a minimum of 100 plants. Comparative data should be determined from varieties entered in the same trial. Royal Horticultural Society or any recognized color standard may be used to determine plant colors; designate system used: _____

Please answer all questions for your variety; lack of response may delay progress of your application.

1. KIND:

[1]
1=Common
2=Durum
3=Club
4=Other (SPECIFY) : _____

2. VERNALIZATION:

[1]
1=Spring
2=Winter
3=Other (SPECIFY) : _____

3. COLEOPTILE ANTHOCYANIN:

[1] 1 = Absent 2 = Present

4. JUVENILE PLANT GROWTH:

[3] 1 = Prostrate 2 = Semi-erect 3 = Erect

5. PLANT COLOR (boot stage):

[2]
1 = Yellow-Green
2 = Green
3 = Blue-Green

6. FLAG LEAF (boot stage):

[2] 1 = Erect
2 = Recurved

[2] 1 = Not Twisted
2 = Twisted

[1] 1 = Wax Absent
2 = Wax Present

7. EAR EMERGENCE:

[0][6][0] Number of Days (Average)

[0][5] Number of Days Earlier Than ALSEN *

Same as 2375 *

[0][1] Number of Days Later Than ALSEN *

* Relative to a PVPO-Approved Commercial Variety Grown in the Same Trial

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8. ANTHER COLOR:

[1]
1 = Yellow
2 = Purple

9. PLANT HEIGHT (from soil to top of head, excluding awns):

[0][8][2] cm (Average)

[0][5] cm Taller Than ALSEN *

Same as _____ *

[0][2] cm Shorter Than PARSHALL *

10. STEM:

A. ANTHOCYANIN

[1]
1= Absent
2 = Present

B. WAXY BLOOM

[1]
1 = Absent
2 = Present

C. HAIRINESS
(last internode of rachis)

[2]
1 = Absent
2 = Present

D. INTERNODE

[1] 1 = Hollow 2 = Semi-solid 3 = Solid

[ ] Number of Nodes

E. PEDUNCLE

[2] 1 = Erect 2 = Recurved 3 = Semi-erect

[5][1] cm Length

F. AURICLE

[1] Anthocyanin 1 = Absent 2 = Present

[1] Hair 1 = Absent 2 = Present

11. HEAD (at Maturity):

A. DENSITY

[2]
1 = Lax
2 = Middense (Laxidense)
3 = Dense

B. SHAPE

[1]
1 = Tapering
2 = Strap
3 = Clavate
4 = Other (SPECIFY): _____

C. CURVATURE

[2]
1 = Erect
2 = Inclined
3 = Recurved

D. AWNEDNESS

[4]
1 = Awnless
2 = Apically Awnletted
3 = Awnletted
4 = Awned

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12. GLUMES (at Maturity):

A. COLOR

[1]
1 = White
2 = Tan
3 = Other (SPECIFY) : _____

B. SHOULDER

[5]
1 = Wanting 2 = Oblique
3 = Rounded 4 = Square
5 = Elevated 6 = Apiculate
7 = Other (SPECIFY): _____

C. SHOULDER WIDTH

[2]
1 = Narrow
2 = Medium
3 = Wide

D. BEAK

[3]
1 = Obtuse
2 = Acute
3 = Acuminate

E. BEAK WIDTH

[2]
1 = Narrow
2 = Medium
3 = Wide

F. GLUME LENGTH

[2]
1 = Short (ca. 7mm)
2 = Medium (ca. 8mm)
3 = Long (ca. 9mm)

G. WIDTH

[3]
1 = Narrow (ca. 3mm)
2 = Medium (ca. 3.5mm)
3 = Wide (ca. 4mm)

13. SEED

A. SHAPE

[2]
1 = Ovate
2 = Oval
3 = Elliptical

B. CHEEK

[1]
1 = Rounded
2 = Angular

C. BRUSH

[2]
1 = Short
2 = Medium
3 = Long

[ ]
1 = Not Collared
2 = Collared

D. CREASE

[2]
1 = Width 60% or less of Kernel
2 = Width 80% or less of Kernel
3 = Width Nearly as Wide as Kernel

[2]
1 = Depth 20% or less of Kernel
2 = Depth 35% or less of Kernel
3 = Depth 50% or less of Kernel

E. COLOR

[3]
1 = White
2 = Amber
3 = Red
4 = Other (SPECIFY): _____

F. TEXTURE

[1]
1 = Hard
2 = Soft
3 = Other (SPECIFY): _____

G. PHENOL REACTION (*see instructions*):

[4]
1 = Ivory 4 = Dark Brown
2 = Fawn 5 = Black
3 = Light Brown

H. SEED WEIGHT

[3][2] g/1000 seed (Whole number only)

I. GERM SIZE

[2]
1 = Small
2 = Midsize
3 = Large

10

14. Disease : (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

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PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED

[2]	Stem Rust *(Puccinia graminis* f. sp. *tritici)* Pgt-QCCJ,-QTHJ,-RTQQ,-TPMK,-QFCQ,-THLK,-HPHJ.	[2]	Leaf Rust *(Puccinia recondita* f. sp. *tritici)* Predominant ND field races (including Trace
[ ]	Stripe Rust *(Puccinia striiformis)*	[0]	Loose Smut *(Ustilago tritici)*
[3]	Tan Spot *(Pyrenophora tritici-repentis)* Insensitive to Tox A	[0]	Flag Smut *(Urocystis agropyri)*
[0]	Halo Spot *(Selenophoma donacis)*	[0]	Common Bunt *(Tilletia tritici* or *T. laevis)*
[1]	*Septoria nodorum* (Glume Blotch) Sensitive to Toxin	[0]	Dwarf Bunt *(Tilletia controversa)*
[0]	*Septoria avenae* (Speckled Leaf Disease)	[0]	Karnal Bunt *(Tilletia indica)*
[0]	*Septoria tritici* (Speckled Leaf Blotch)	[0]	Powdery Mildew *(Erysiphe graminis* f. sp. *tritici)*
[3]	Scab (*Fusarium* spp.) Greenhouse and field inoculation	[0]	"Snow Molds"
[3]	"Black Point" (Kernel Smudge)	[3]	Common Root Rot *(Fusarium, Cochliobolus* and *Bipolaris* spp.)
[0]	Barley Yellow Dwarf Virus (BYDV)	[0]	Rhizoctonia Root Rot *(Rhizoctonia solani)*
[0]	Soilborne Mosaic Virus (SBMV)	[0]	Black Chaff *(Xanthomonas campestris* pv. *translucens)*
[0]	Wheat Yellow (Spindle Streak) Mosaic Virus	[0]	Bacterial Leaf Blight *(Pseudomonas syringae* pv. *syringae)*
[0]	Wheat Streak Mosaic Virus (WSMV)	[ ]	Other (SPECIFY) _____
[ ]	Other (SPECIFY) _____	[ ]	Other (SPECIFY) _____
[ ]	Other (SPECIFY) _____	[ ]	Other (SPECIFY) _____
[ ]	Other (SPECIFY) _____	[ ]	Other (SPECIFY) _____

15. INSECT: (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

PLEASE SPECIFY BIOTYPE (where needed)

[0]	Hessian Fly *(Mayetiola destructor)*	[ ]	Other (SPECIFY) _____
[0]	Stem Sawfly *(Cephus* spp.)	[ ]	Other (SPECIFY) _____
[0]	Cereal Leaf Beetle *(Oulema melanopa)*	[ ]	Other (SPECIFY) _____
[0]	Russian Aphid *(Diuraphis noxia)*	[ ]	Other (SPECIFY) _____

15. INSECT: *Continued* (0=Not Tested; 1=Susceptible; 2=Resistant; 3=Intermediate; 4=Tolerant)

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PLEASE SPECIFY BIOTYPE (where needed)

[0] Greenbug *(Schizaphis graminum)*

[ ] Other (SPECIFY) _____

[0] Aphids

[ ] Other (SPECIFY) _____

16. ADDITIONAL INFORMATION ON ANY ITEM ABOVE, OR GENERAL COMMENTS

WHEAT DESCRIPTOR ILLUSTRATIONS

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Section numbers correspond to the numbers of the sections on the form.

4 EARLY PLANT GROWTH HABIT:

1 Prostrate | 2 Intermediate | 3 Erect

10 STEM INTERNODE X-SECTION

1 Hollow | 2 Semi-Solid | 3 Solid

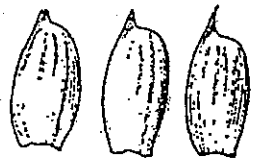
11 SPIKE SHAPE

1 Tapering | 2 Oblong | 3 Clavate | 4 Elliptical

11 AWNEDNESS:

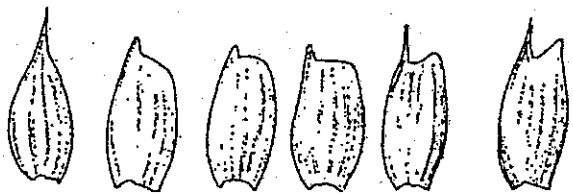
1 Awnless | 2 Apically Awnleted | 3 Awnleted | 4 Awned

12 BEAK SHAPE:



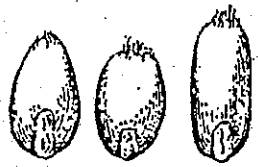
1 Obtuse | 2 Acute | 3 Acuminate

12 SHOULDER SHAPE:



1 Wanting | 2 Oblique | 3 Rounded | 4 Square | 5 Elevated | 6 Apiculate

13 SEED SHAPE:

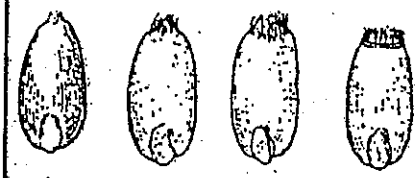


1 Ovate | 2 Oval | 3 Elliptical

13 CHEEK SHAPE:

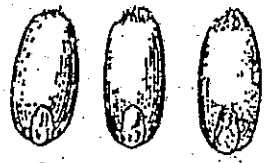
1 Rounded | 2 Angular

13 BRUSH SIZE:



1 Small | 2 Midsized | 3 Large | Collared

13 BRUSH HAIR LENGTH



1 Short | 2 Medium | 3 Long

GERM (EMBRYO) SIZE:

1 Small | 2 Midsized | 3 Large

13 SEED CREASE WIDTH:

1 Narrow | 2 Mid-Wide | 3 Wide

13 SEED CREASE DEPTH:

1 Shallow | 2 Mid-Deep | 3 Deep

REFERENCE

Briggle, L.W. and L.P. Reitz. 1963. Classification of Triticum Species and of Wheat Varieties Grown in the United States. Technical Bulletin 1278. United States Department of Agriculture.

EXHIBIT D – ADDITIONAL DATA

1. Steele-ND (ND 741) is high yielding cultivar with very good bread-making attributes based on 3 years (2001-2003) ND State trials data (Tables 5 and 6) and Wheat Quality Council 2002 trials (Tables 7-9). Steele-ND is moderately resistant to Fusarium head blight (FHB) scab disease (Table 10), resistant to stem and leaf rusts (Table 11 and 12), and moderate resistant to tan spot and moderate susceptible to Septoria (Table 13).

2. Steele-ND grain yield and agronomic traits during the years of 2001 and 2002 are included in Tables 1 and 2. Performance of Steele-ND in the 2001 and 2002 URN trials are reported in Tables 3 and 4.

Table 1. **Grain yield of Steele –ND (ND 741) and selected HRSW cultivars in the 2001-2002 hard red spring wheat variety trials at North Dakota Agricultural Research Extension Centers.**

Variety or line	Hettinger (5) 2002	Dickinson	North Central	Carrington Dryland	Carrington Irrigated	Langdon
			bu/ac			
Semi dwarf						
AC Superb		42.65	58.4	37.9	52.25	60.65
Alsen	25.8	41.7	62.45	47.95	56.4	57.2
Briggs	25.4	40.55	63.1	55.45	65.9	66.55
Dandy	24.9*	37.7	58.8	50.05	57.25	66.8
Ember	--	40.5	67.6	39.1	58.15	64.3
HJ98	--	44.45	66	43.7	59.3	63.7
Ivan	--	46.75	70	41.4	47.75	56.6
Knudson	20.9*	42.05	64.5	49	62.85	60.45
Norpro	23.1*	44.15	68.7	48.6	45.7	60.35
Oxen	26.3	43.45	64.7	42.9	59.1	59.55
Reeder	27	44.55	66.95	45.9	55.1	61.5
Walworth	26	42.25	63.55	50.15	63.85	60
ND741	**27.5**	**42.55**	**61.65**	**51.65**	**59.7**	**61.4**
Conventional						
Amidon						
Gunner	21.0*	42.35	55.4	40.25	47.85	53.85
Hanna	23.8*	41.75	59.15	41.5	60.4	65.8
Ingot	24.2	38.25	61.5	49.15	64.9	58.6
Keene	28.2	47.2	59.8	48.3	62.7	--
Keystone	22.6*	40.55	60.5	52.6	61.9	59.1
McKenzie	22.3*	--	--	--	--	--
McNeal	--	--	--	--	--	--
Parshall	24.9	40.95	60.45	47.7	62.55	63.35
Russ	21.2	38.15	61.85	45.95	53	64.45
LSD .05	4.2	5.2	6.3	7.05	8.75	5.55

( ) Number of testing site tested
*Tested in one site (Hettinger)

Table 2. **Agronomic traits of Steele-ND (ND 741) and selected HRSW cultivars in the 2001and 2002 hard red spring wheat variety trials at North Dakota Agricultural Research Extension Centers.**

Variety	Days to Heading (5)	Plant Height (11)	Lodging Score (2)	Diseases (2)	Tomb-stone (1)	Test Weight (10)	Protein Conetnt (9)	Yeild 2002 (10)	1000 KW (1)	Shattering (1)
	days	Inches	0-9	%	%	lbs/bu	%	Bu/ac	Gms	Seeds*
Semi dwarf										
AC Superb	58.0	32.2	3.4	58.5	2.0	58.3	16.1	49.5	29.1	0.3
Alsen	58.3	30.1	2.3	44.3	1.3	60.5	16.3	50.3	28.1	4.0
Briggs	58.2	31.2	2.1	50.5	2.3	60.3	16.0	55.9	30.8	2.8
Dandy	60.0	31.0	1.4	77.5	3.5	60.2	15.2	55.9	28.8	3.0
Ember	57.3	29.9	2.2	64.3	1.3	60.3	14.6	50.5	25.3	0.0
HJ98	61.1	30.0	3.5	76.0	1.8	58.6	14.8	57.7	27.1	0.5
Ivan	64.5	29.7	1.9	41.5	1.5	58.9	14.1	53.8	29.3	0.3
Knudson	59.5	28.3	2.3	32.3	2.0	59.9	15.2	54.1	34.1	0.5
Norpro	59.1	27.6	1.4	42.5	2.8	59.0	15.3	55.4	29.8	1.3
Oxen	59.4	30.7	4.2	79.5	3.3	57.7	15.6	51.9	26.7	1.3
Reeder	57.7	30.8	2.2	42.8	2.5	59.3	15.7	52.9	28.3	1.0
Walworth	56.8	30.1	4.0	65.8	4.3	58.3	15.8	52.6	25.7	0.8
ND741	**60.1**	**32.1**	**3.1**	**40.0**	**1.3**	**60.4**	**15.8**	**54.1**	**31.9**	**4.3**
Conventional										
Amidon*	--	--	--	--	--	57.8	15.9	37.7		
Gunner	61.3	32.3	3.9	46.0	0.8	60.1	16.5	48.0	23.2	0.0
Hanna	60.5	34.8	3.0	73.5	0.8	59.6	15.4	54.5	29.3	0.3
Ingot	57.1	33.6	2.1	87.5	2.3	61.4	15.9	50.7	25.1	7.3
Keene*	56.0	28.2	2.0	15.0	--	59.4	16.2	42.8	27.7	
Keystone	58.7	31.6	2.2	70.5	2.0	61.1	14.6	53.8	27.1	3.5
McKenzie*	53.4	27.0	--	15.0	--	58.2	16.0	45.5		
McNeal*	51.0	23.8	--	1.0	--	56.8	16.1	33.6		
Parshall	58.4	33.3	2.2	50.0	2.5	60.6	16.0	51.6	28.1	0.8
Russ	59.1	32.6	3.75	83.5	2.8	58.35	15.15	56.5	29	0.8

( ) Number of testing sites
*Seeds/ft2

Table 3. 2001 Hard Red Spring Wheat Uniform Regional Nursery Summary of Means Across Locations.

Line	Yield	Test Wt.	Heading	Height	Lodging	Protein
	Bu/Ac	Lb/Bu	d from 6-1	cm	0-9	%
No. Locations	12	15	13	15	4	6
ND740	64.9	60.6	24	77	2.6	13.8
N97-0100	61.5	57.9	26	73	0.7	14.3
FA900-720	60.6	62.4	27	86	1.5	14.0
SD3545	60.1	60.0	24	85	2.8	14.8
SD3540	60.1	59.6	23	84	1.2	14.3
MT9874	59.9	58.0	28	82	1.5	14.1
N97-2627	59.9	58.0	28	82	2.6	14.3
SD3367	59.4	59.4	24	82	2.6	14.4
2375	59.2	59.9	26	80	2.6	14.2
SD3496	59.1	59.4	23	85	2.1	14.6
N97-0117	58.8	58.5	25	72	1.4	14.6
ND741	58.7	59.3	25	82	3.0	15.0
MN97803	58.6	59.4	24	81	2.6	14.7
SD3506	58.4	60.5	26	89	2.1	14.6
ND729	58.4	60.7	26	94	4.1	14.3
VERDE	58.4	58.5	28	78	1.6	14.3
N96-0055	58.2	59.4	26	74	0.6	14.5
MN97448	58.0	60.0	25	77	1.4	14.6
KEENE	57.9	59.0	27	94	2.4	14.4
MN97063	57.7	58.9	28	76	2.0	14.3
N97-0189	57.6	57.2	26	74	2.3	14.2
98S0191-60-8	57.1	57.7	27	88	3.7	14.3
WA7875	56.8	58.6	24	88	2.2	14.0
ND743	55.7	59.5	25	88	2.6	15.1
ND742	55.6	59.6	25	80	1.8	15.4
RL4958	54.1	56.2	25	83	1.6	15.6
WA7899	54.0	56.7	25	80	3.7	13.0
FA900-793	53.9	59.3	23	74	0.6	14.8
WA7859	52.8	57.8	26	89	2.7	14.6
BW270	51.4	58.7	27	95	2.7	15.1
CHRIS	41.7	56.7	28	99	6.0	15.1
MARQUIS	40.7	56.4	28	100	4.6	14.5
MEAN	56.9	58.9	26	84	2.4	14.5
LSD (0.05)	4.3	1.4	1	3	2.0	0.6

Table 4 Means of the 2002 HRSW Uniform Regional Nursery across locations in ND and SD

No	Variety	Grain Yield	Test Weight	Days to Head	Plant Height	Plant Lodge	Leaf Disease	1000 KWT	Protein
		bu/ac	lbs/bu		cm	0-9	% flag	gms	%
1	2375	39.2	57.6	48.1	69.6	3.7	89.3	26.8	14.8
2	01M88	35.8	55.8	49.9	60.8	1.0	74.0	22.4	13.7
3	01M96	37.9	59.3	46.9	69.1	1.3	52.3	30.2	15.7
4	01M97	34.9	58.2	46.5	68.4	1.0	50.7	27.2	15.9
5	01M98	38.9	56.2	47.4	69.5	2.7	33.3	27.6	15.4
6	BW306	33.7	55.4	49.3	74.3	1.7	60.7	32.7	16.1
7	BW313	34.9	55.2	48.2	81.8	2.7	80.0	27.6	16.5
8	CA-901-712	37.5	57.5	45.0	59.9	3.0	65.0	27.5	16.9
9	Chris	26.8	52.8	50.5	134.8	2.7	73.3	23.0	15.9
10	FA-900-720	35.1	58.4	49.7	72.9	1.0	69.3	25.6	14.1
11	HY469	38.6	55.8	47.1	62.5	2.0	47.3	30.9	14.8
12	Keene	36.9	56.3	50.0	76.4	1.3	12.3	26.6	15.6
13	Marquis	26.3	54.0	51.3	86.8	3.7	87.3	25.1	14.8
14	MN97695-4	42.1	59.1	46.8	66.3	1.6	47.7	28.6	15.6
15	MN98389-A	41.8	56.7	47.3	70.7	3.0	64.0	28.9	14.9
16	MT9874	31.7	54.6	51.5	70.0	1.3	66.3	27.7	15.6
17	MT9929	38.3	55.1	49.2	66.6	1.3	42.7	28.7	15.6
18	N96-0055	34.4	56.3	49.5	64.2	1.0	74.0	26.3	15.6
19	N97-0117	37.7	57.1	48.7	63.0	1.3	20.7	28.1	16.0
20	N98-0286	38.4	54.4	49.7	64.1	1.3	66.0	27.7	15.1
21	N98-0326	40.4	55.7	48.3	63.9	1.0	64.0	27.8	14.8
22	N98-0328	39.9	55.8	49.2	63.1	1.3	70.0	26.9	14.6
23	N99-0107	39.7	57.9	48.8	72.3	1.7	68.0	25.6	15.2
25	**ND741**	**42.9**	**58.9**	**48.2**	**74.4**	**1.0**	**9.3**	**28.7**	**15.5**
29	NDSW0246	38.2	57.8	50.0	79.8	1.3	29.3	29.3	16.2
30	SD3533	42.9	57.8	47.0	73.1	2.0	73.7	26.9	14.7
31	SD3540	43.6	58.3	46.7	72.2	1.3	60.0	27.8	14.6
32	SD3546	43.7	58.3	48.0	73.4	1.3	49.3	32.3	15.1
33	SD3623	45.8	58.2	47.3	77.9	1.6	62.7	29.1	14.4
34	SD3641	44.3	58.2	45.5	69.2	3.0	60.0	27.9	15.0
35	WA007899	29.4	53.9	48.7	68.1	5.3	88.7	25.0	13.8
36	WA007914	32.5	55.7	49.3	73.2	1.3	77.7	31.0	14.5
	LSD.05	5.1	1.4	1.5	3.7	0.8	7.6	1.8	0.4

Table 5.

FIELD PLOT VARIETY TRIALS

ND741

NORTH DAKOTA STATE UNIVERSITY
AGRICULTURAL EXPERIMENT STATION
DEPARTMENT OF CEREAL SCIENCE
ANALYTICAL, MILLING AND BAKING DATA
HARD RED SPRING WHEAT

			TEST		VIT	WHT FAL	PROTEIN 14% MB		FARINOGRAM FLR	WET	FLR	FARINOGRAM PEAK MIX				3 HOUR FERMENTATION MIX			LOAF				
LAB NO	VARIETY OR NUMBER	YLD BPA	WT LB/BU	GRA	KER %	NO SEC	WHT %	FLR %	EXT %	GLU %	ASH %	TIME MIN	TOL MIN	MTI BU	CLASS	ABS %	TIME MIN	DO	VOL CC	G-T	CB CL	CT CL	SYM
								2001															
1	ALSEN	ND	61.8	1DNS	91	402	15.2	14.3	68.1	41.6	0.48	7.0	13.3	39	5.3	62.8	2.05	9.8	1073	8.1	8.3	10.0	10.0
2	PARSHALL	ND	61.9	1DNS	90	387	15.2	14.4	68.6	41.5	0.46	7.1	13.9	33	5.5	62.8	2.00	9.8	1075	7.8	8.8	10.0	10.0
3	REEDER	ND	60.0	1DNS	78	424	15.2	14.4	67.6	43.5	0.44	6.9	14.9	25	5.7	62.4	1.85	9.8	1074	7.8	7.8	10.0	9.7
4	ND741	ND	61.6	1DNS	86	387	15.0	14.3	69.5	41.6	0.45	7.0	14.2	27	5.7	64.4	2.15	10.0	1103	7.8	8.4	10.0	10.0
								2002															
1	ALSEN	ND	59.7	1DNS	77	382	16.1	15.5	69.6	40.4	0.51	12.8	25.3	22	7.0	67.2	2.65	9.7	1167	8.1	8.2	10.0	10.0
2	PARSHALL	ND	59.7	1DNS	84	388	15.8	15.1	69.2	40.9	0.47	12.8	23.8	21	6.8	65.4	2.45	9.7	1208	8.2	8.8	10.0	10.0
3	REEDER	ND	58.9	1DNS	76	380	15.5	14.8	68.4	40.8	0.45	8.6	16.7	27	6.0	64.9	2.15	9.7	1124	7.9	7.9	10.0	10.0
4	ND741	ND	59.4	1NS	71	394	15.6	15.0	70.8	40.5	0.48	9.9	24.1	22	6.8	67.8	2.45	9.3	1188	8.3	8.5	10.0	10.0
								2003															
1	ALSEN	ND	61.6	1DNS	87	404	15.0	14.2	69.9	39.0	0.44	12.0	19.8	19	6.9	65.9	2.50	10.0	1089	8.3	8.6	10.0	10.0
2	PARSHALL	ND	61.9	1DNS	91	400	14.8	14.1	69.6	39.1	0.42	12.4	22.6	18	6.7	65.8	2.40	9.9	1096	8.2	8.9	10.0	9.9
3	REEDER	ND	60.7	1DNS	87	407	14.6	13.9	68.4	40.2	0.40	11.9	17.6	20	6.1	65.5	2.05	9.3	1055	7.6	7.7	10.0	9.9
4	ND741	ND	61.9	1DNS	87	413	15.2	14.5	70.7	41.4	0.40	9.9	16.3	21	6.6	67.7	2.10	9.9	1086	8.2	8.4	10.0	10.0

ND NOT DETERMINED

2001 - average six locations
2002 - average six locations
2003 - average seven locations

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Table 6.

FIELD PLOT VARIETY TRIALS

ND741

NORTH DAKOTA STATE UNIVERSITY
AGRICULTURAL EXPERIMENT STATION
DEPARTMENT OF CEREAL SCIENCE AND FOOD TECHNOLOGY
ANALYTICAL, MILLING AND BAKING DATA

										FARINOGRAM				3 HOUR FERMENTATION							
		TEST	VIT	WHT FAL	PROTEIN 14% MB		FLR	WET	FLR	PEAK MIX				MIX	LOAF						
VARIETY OR NUMBER	YLD BPA	WT LB/BU	KER %	NO SEC	WHT %	FLR %	EXT %	GLU %	ASH %	TIME MIN	TOL MIN	MTI BU	CLASS	ABS %	TIME MIN	DO	VOL CC	G-T	CB CL	CT CL	SYM
ALSEN	ND	61.0	85	396	15.4	14.7	69.2	40.3	0.48	10.6	19.5	27	6.4	65.3	2.40	9.8	1110	8.2	8.4	10.0	10.0
ND741	ND	61.0	81	398	15.3	14.6	70.3	41.2	0.44	8.9	18.2	23	6.4	66.6	2.25	9.7	1126	8.1	8.4	10.0	10.0
PARSHALL	ND	61.2	88	392	15.3	14.5	69.1	40.5	0.45	10.8	20.1	24	6.3	64.7	2.30	9.8	1126	8.1	8.8	10.0	10.0
REEDER	ND	59.9	80	404	15.1	14.4	68.1	41.5	0.43	9.1	16.4	24	5.9	64.3	2.00	9.6	1084	7.8	7.8	10.0	9.9

Average of 19 growing locations

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Table 7:

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2002 WHEAT QUALITY COUNCIL TRIALS

Summary of Kernel and Milling Characteristics

Kernel and Milling Characteristics												
LAB ID	Cultivar	TW lb/bu	Kernel Size large %	Kernel Size small %	1000 kwt g	Vitreous Kernel %	NIR Hardness	Falling Number sec	Wheat Moisture %	Wheat Protein 14%mb	Wheat Ash 14%mb	Flour Ext %
B-1	Grandin	57.4	69	3	29.6	88.6	72.1	376	15.3	16.0	1.85	69.7
B-3	ND 741	58.0	64	4	27.0	95.3	78.3	389	15.7	16.3	1.85	67.1
B-4	ND 724	55.8	43	5	26.7	96.3	82.1	378	15.4	17.5	1.85	68.4
B-5	Parshall	57.8	46	10	24.9	94.4	63.5	388	15.4	15.8	1.82	64.2
B-6	BR2238R	55.5	31	15	24.8	82.5	49.5	394	15.1	15.2	1.75	68.5
B-7	BR4888	55.5	53	7	27.4	65.8	59.2	408	15.0	16.3	1.92	66.1
B-8	N96-0055	57.4	55	5	25.6	76.4	56.1	394	14.6	15.9	1.94	67.5
C-1	Grandin	59.6	60	5	28.0	50.1	62.5	380	10.3	14.2	1.75	71.4
C-2	MN 97803	60.5	63	4	29.1	47.1	54.3	378	11.0	14.9	1.71	71.1
C-3	ND 741	61.4	59	6	26.7	57.1	60.1	335	10.6	14.7	1.73	69.1
C-4	ND 724	57.8	52	6	26.3	83.3	63.7	347	11.1	16.4	1.74	70.8
C-5	Parshall	61.8	51	10	26.7	60.6	61.8	385	11.2	14.8	1.79	69.3
C-7	BR4888	55.4	52	9	26.8	29.1	43.8	325	10.0	14.1	1.86	66.5
C-8	N96-0055	60.4	65	5	27.5	40.1	52.2	352	10.9	14.2	1.81	69.3
K-2	MN 97803	56.2	42	9	25.2	1.9	62.4	252	13.9	13.6	1.86	71.2
K-5	Parshall	58.6	43	12	24.3	60.9	65.2	344	14.1	13.9	1.74	70.6
K-7	BR4888	56.2	52	8	26.0	8.1	49.9	274	13.6	13.2	1.76	69.2
K-8	N96-0055	55.7	44	8	24.3	1.1	46.0	263	13.5	13.2	1.89	69.5
M-3	ND 741	55.8	42	7	25.1	12.0	53.7	388	8.7	15.7	1.55	70.5
M-5	Parshall	56.2	31	10	24.4	50.5	66.2	201	9.9	14.8	1.52	70.6
M-7	BR4888	53.6	57	4	28.7	1.8	40.4	307	8.7	15.0	1.63	68.1

* B= Brookings, SD
C = Casselton, ND
K= Krookston, MN
M= Minot, ND

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Table 8: 2002 WHEAT QUALITY COUNCIL TRIALS

Bake Cooperator #9 (ND)
(Straight Dough)

Lab ID	Cultivar	Bake Absorption Actual (%)	Bake Absorption Rating Score	Bake Mix Time Actual (min)	Bake Mix Time Rating Score	Mix Tolerance Actual (min)	Mix Tolerance Rating Score	Loaf Volume Actual (cc)	Loaf Volume Rating Score	Crumb Color Rating Score	Crumb Grain Rating Score	Crumb Texture Rating Score	Bake Rating Score	Describe dough out of mixer and at makeup (elastic, extensible, sticky, weak, bucky, dry, e Out of Mixer	At Makeup
B1	Grandin	62.5	4.0	2.75	3.0	34.0	6.0	1100	4.0	5.0	4.0	4.0	4.25	v. good	v. good
B3	ND 741	65.3	5.0	2.50	3.0	31.5	6.0	1155	5.0	4.0	6.0	6.0	4.75	v. good	sl. bucky
B4	ND 724	65.7	5.0	3.00	3.0	24.0	6.0	1275	6.0	6.0	5.0	5.0	5.00	sl.sticky	sl. bucky
B5	Parshall	62.4	4.0	3.00	3.0	35.5	6.0	1225	6.0	6.0	5.0	5.0	4.75	v. good	sl. bucky
B6	BR2238R	58.5	2.0	4.25	4.0	42.0	6.0	1090	4.0	5.0	4.0	4.0	4.00	good	v. bucky
B7	BR4888	62.9	4.0	3.00	3.0	24.0	6.0	1125	5.0	4.0	5.0	5.0	4.50	sl. sticky	bucky
B8	N96-0055	61.7	3.0	3.00	3.0	43.0	6.0	1135	5.0	5.0	4.0	4.0	4.25	sl. dry	bucky
C1	Grandin	60.4	3.0	2.75	3.0	17.0	5.0	1125	5.0	4.0	4.0	4.0	4.00	good	v. good
C2	MN 97803	59.6	2.0	2.25	3.0	14.5	4.0	1060	4.0	5.0	6.0	6.0	3.25	sl. slack	v. good
C3	ND 741	61.3	3.0	2.75	3.0	18.0	5.0	1135	5.0	3.0	4.0	4.0	4.00	v. good	v. good
C4	ND 724	62.1	4.0	2.50	3.0	19.0	5.0	1175	5.0	5.0	5.0	5.0	4.25	good	v. good
C5	Parshall	60.3	3.0	2.75	3.0	16.5	5.0	1075	4.0	5.0	4.0	4.0	3.75	sl. slack	good
C7	BR4888	58.9	2.0	3.00	3.0	16.0	5.0	1050	4.0	3.0	2.0	2.0	3.50	sl. slack	good
C8	N96-0055	59.0	2.0	3.50	4.0	25.0	6.0	1025	4.0	5.0	5.0	5.0	4.00	sl. slack	good
K2	MN 97803	57.7	1.0	2.50	3.0	14.5	4.0	1150	5.0	6.0	2.0	2.0	3.25	sl. Slack	v. good
K5	Parshall	58.7	2.0	2.75	3.0	15.0	4.0	1100	5.0	4.0	5.0	5.0	3.50	sl. slack	v. good
K7	BR4888	58.4	2.0	2.75	3.0	13.5	4.0	1000	4.0	5.0	4.0	4.0	3.25	sl. weak	v. good
K8	N96-0055	58.5	2.0	2.75	3.0	17.0	5.0	1100	5.0	4.0	4.0	4.0	3.75	sl. weak	v. good
M3	ND 741	63.0	4.0	3.00	3.0	40.0	6.0	1190	5.0	3.0	2.0	2.0	4.50	good	sl. bucky
M5	Parshall	60.7	3.0	3.50	4.0	34.5	6.0	1085	4.0	5.0	5.0	5.0	4.25	sl. Slack	sl.bucky
M7	BR4888	61.2	3.0	3.00	3.0	17.5	5.0	1025	4.0	4.0	4.0	4.0	3.75	good	good

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Table 9 : BAKING PROPERTIES

2002 WQC Samples ND 741

Sample ID	Bake Absorption Actual (min)	Bake Absorption Rating score	Bake Mix Time Actual (min)	Bake Mix Time Rating Score	Mix Tolerance Actual (min)	Mix Tolerance Rating Score	Loaf Volume Actual (cc)	Loaf Volume Rating Score	Crumb Color Rating Score	Crumb Grain Rating Score	Crumb Texture Rating Score	Overall Bake Rating Score	Wheat Protein
Grandin	62.6	4	2.75	3	34.0	6	1100	4	5	4	4	4.3	16.0
	60.4	3	2.75	3	17.0	5	1125	5	4	4	4	4.0	14.2
Avg.	61.5	3.5	2.75	3.00	25.50	5.50	1113	4.5	4.5	4.0	4.0	4.2	15.1
Parshall	62.4	4	3.00	3	35.5	6	1225	6	6	5	5	4.8	15.8
	60.3	3	2.75	3	16.5	5	1075	4	5	4	4	3.9	14.8
	60.7	3	3.50	4	34.5	6	1085	4	5	5	5	4.2	14.8
Avg.	61.1	3.3	3.08	3.33	28.83	5.67	1128	4.7	5.3	4.7	4.7	4.3	15.1
ND 741	65.3	5	2.50	3	31.5	6	1155	5	4	6	6	5.0	16.3
	61.3	3	2.75	3	18.0	5	1135	5	3	4	4	4.0	14.7
	63.0	4	3.00	3	40.0	6	1190	5	3	2	2	4.3	15.7
Avg.	63.2	4.0	2.8	3.0	29.8	5.7	1160.0	5.0	3.3	4.0	4.0	4.4	15.6

LOCATIONS
Brookings
Casselton
Minot

Rating scale: 1 to 6

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Table 10: **ND 741/ND 751: Reaction to Scab**

Summary: 2001-2003

Line		FHB %
ND 741	6 trials	35.5
ND 751	6 trials	31.7
Alsen	7 trials	34.7
2375	6 trials	39.4
2398	7 trials	72.6

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Table 11c

Summary of reactions to the natural population of wheat leaf rust in nurseries at Fargo, Carrington, and Langdon.

Wheat Line	2002	2001	2000	1999
B/W (check)	S	S	S	S
ND724	R, tMR, tMS	---	---	R, tMR
ND741	R, tMR	R, tMR	R, tMS	---
Keene (R check)	R	R	R	R

S = susceptible

R = resistant

tMR = trace levels of moderately resistant reactions. MR reactions appear as small sporulating pustules, usually surrounded by necrosis.

tMS = trace levels of moderately susceptible reactions. MS reactions typically are surrounded by chlorosis and are larger than those of the MR type.

Table 12e.

Composite seedling and adult plant reactions of HRSWs to two "T" races of the wheat leaf rust fungus in the greenhouse trials over two years.

Line	Seedling reaction	Flag leaf reaction
Thatcher (check)	S	S
ND724	R, MR	R, MR
ND741	MR, MS	MR, MS
Alsen	MS, S	MR, MS

S = susceptible

R = resistant

MR = small sporulating pustules, usually surrounded by necrosis.

MS = medium-sized sporulating pustules, usually surrounded by chlorosis.

Multiple reaction types are common on a single leaf. The predominant reaction is listed first (usually R) and the secondary reaction type (less common) is listed next.

Table 13a

Reaction of ND741 to *Septoria nodorum* in the field and in the greenhouse. Disease evaluations were on a scale of 1 (resistant) to 5 (susceptible).

Line	Field Reaction	Greenhouse Reaction	Toxin Reaction	Overall Evaluation
Alsen	5	5	Sensitive	S
ND741	5	4	Sensitive	S
Erik (check)	1-2	1	Insensitive	R-MR

Reaction of ND741 to *Pyrenophora tritici-repentis* (tan spot) in the field and in the greenhouse. Disease evaluations were on a scale of 1 (resistant) to 5 (susceptible).

Line	Field Reaction	Greenhouse Reaction	Toxin Reaction	Overall Evaluation
Alsen	5	5	Sensitive	S
ND741	3	2-3	Insensitive	MS/MR
Erik (check)	1-2	1	Insensitive	R

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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

Application is required in order to determine if a plant variety protection certificate is to be issued *(7 U.S.C. 2421)*. The information is held confidential until the certificate is issued *(7 U.S.C. 2426)*.

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
NDSU Research Foundation	ND741	'Steele-ND'

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)*	5. TELEPHONE *(Include area code)*	6. FAX *(Include area code)*
C/O Executive Director PO Box 5002 Fargo, ND 58105	701-231-8931	701-231-6661

7. PVPO NUMBER **2004 00 188**

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. **If no, please explain.** ☑ **YES** ☐ **NO**

9. Is the applicant (individual or company) a U.S. national or a U.S. based company? **If no, give name of country.** ☑ **YES** ☐ **NO**

10. Is the applicant the original owner? ☐ **YES** ☑ **NO** **If no, please answer one of the following:**

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?
☐ **YES** ☐ **NO** **If no, give name of country**

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?
☑ **YES** ☐ **NO** **If no, give name of country**

11. Additional explanation on ownership *(Trace ownership from original breeder to current owner. Use the reverse for extra space if needed)*:

See additional exhibit E - Statement of the Basis of the Applicant's Ownership.

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.

2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.

3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 0.1 hour per response, including the time for reviewing the instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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EXHIBIT E – STATEMENT OF THE BASIS OF THE APPLICANT'S OWNERSHIP

Dr. Mohamed Mergoum, an employee of the North Dakota Agricultural Experiment Station and North Dakota State University, is a plant breeder who developed "Steele-ND" the hard red spring wheat cultivar for which Plant Variety Protection is herby sought. The employee by agreement and because of the condition of the use of facilities and funds of the North Dakota Agricultural Experiment Station and North Dakota State University has assigned all ownership rights to "Steele-ND" hard red spring wheat to the North Dakota Agricultural Experiment Station and North Dakota State University.

North Dakota State University on behalf of the North Dakota Agricultural Experimental Station has assigned all ownership to the NDSU Research Foundation. The NDSU Research Foundation is a nonprofit corporation set up to own and manage the intellectual property of North Dakota State University